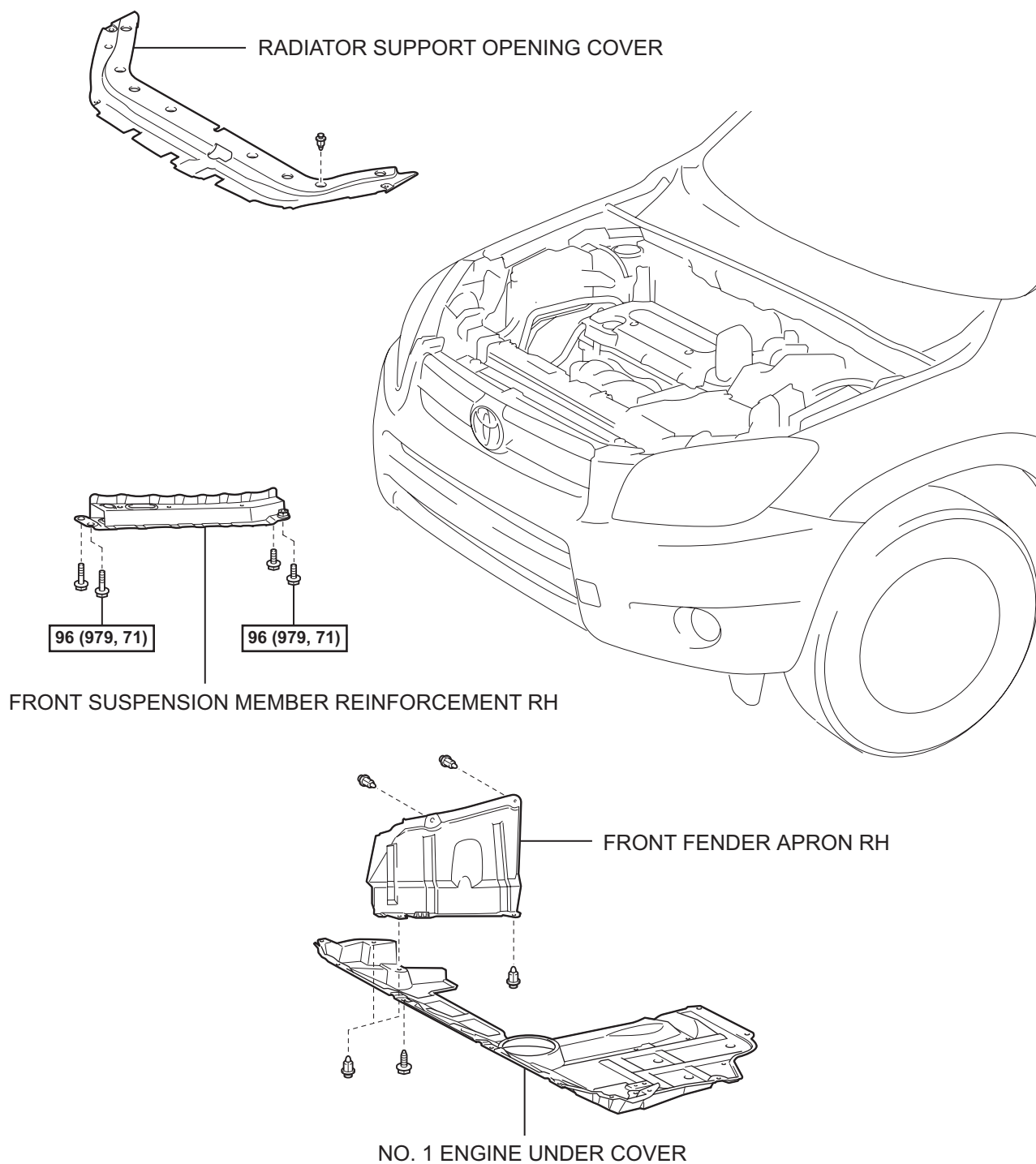


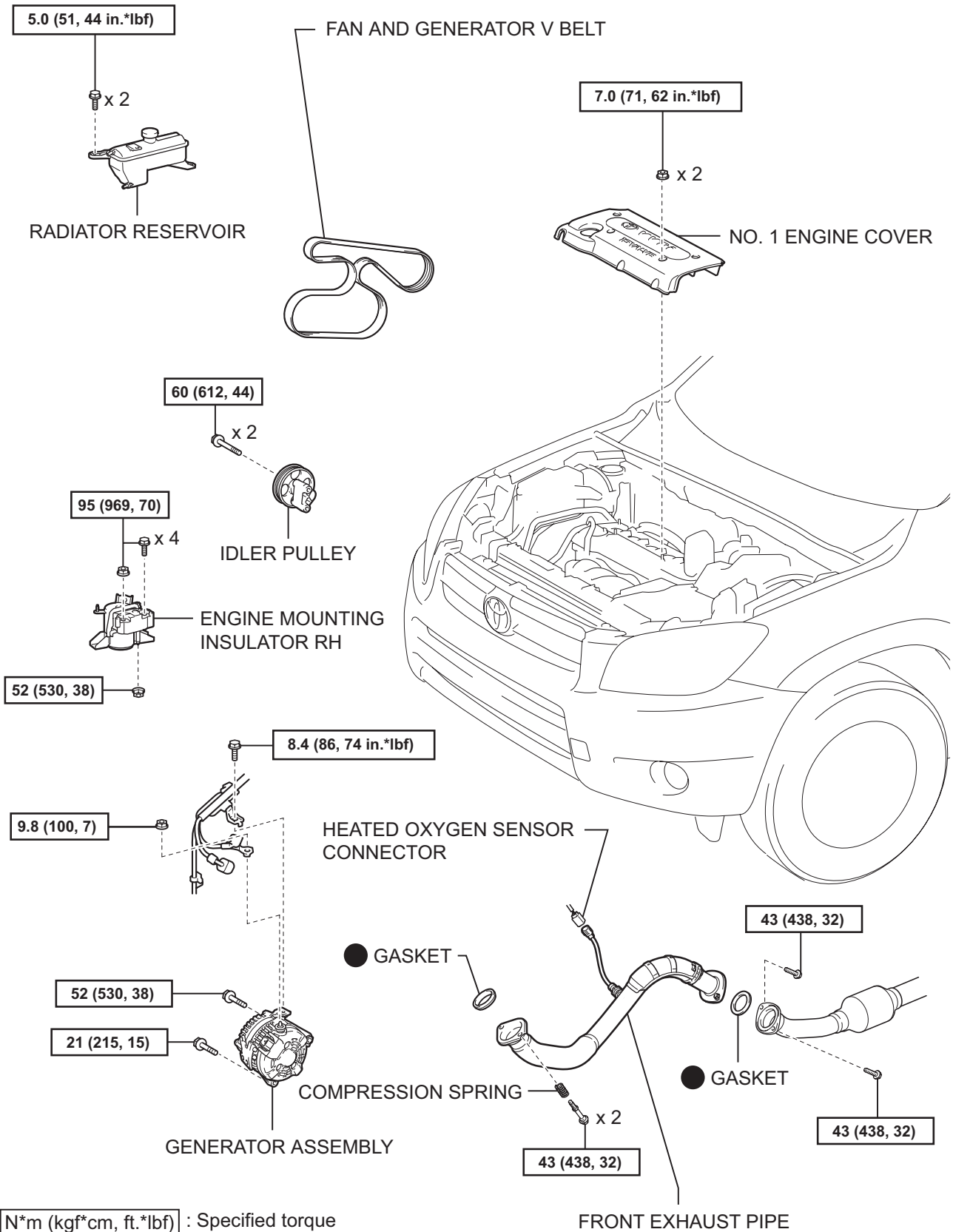
# TIMING CHAIN

## COMPONENTS



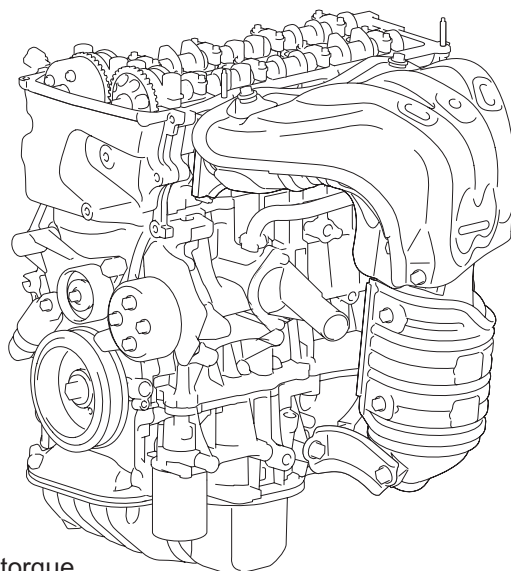
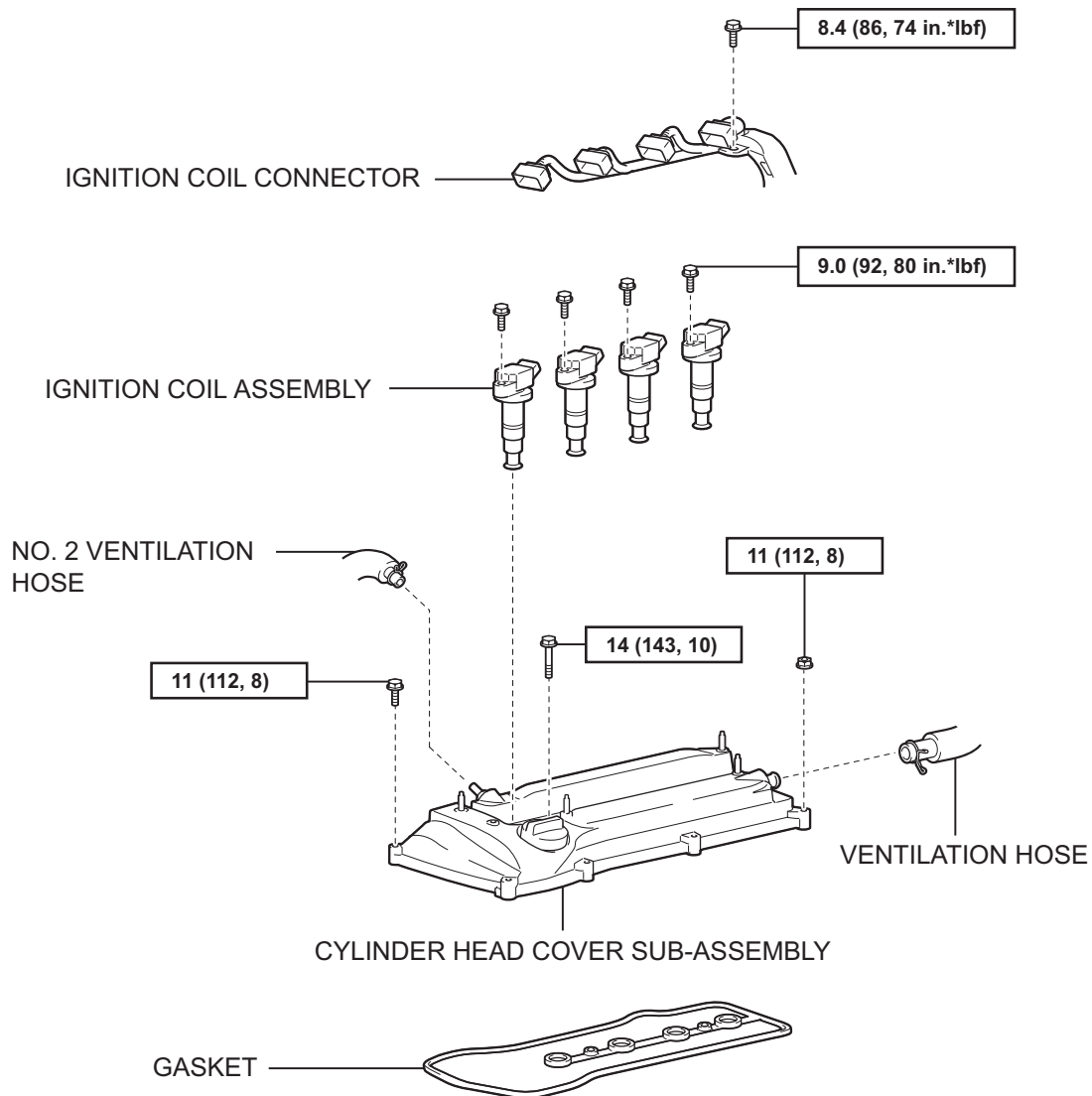
N\*m (kgf\*cm, ft.\*lbf) : Specified torque

EM

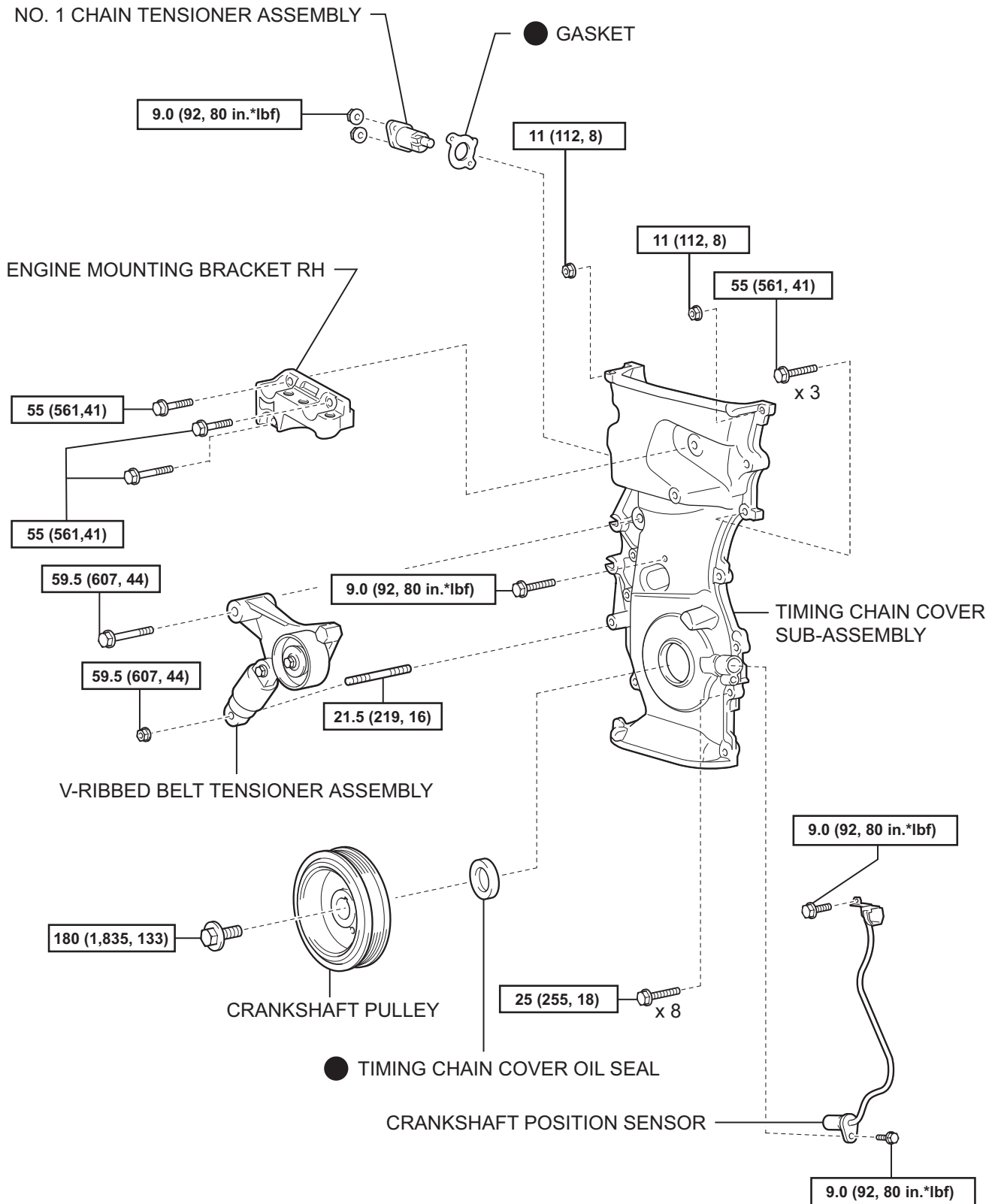


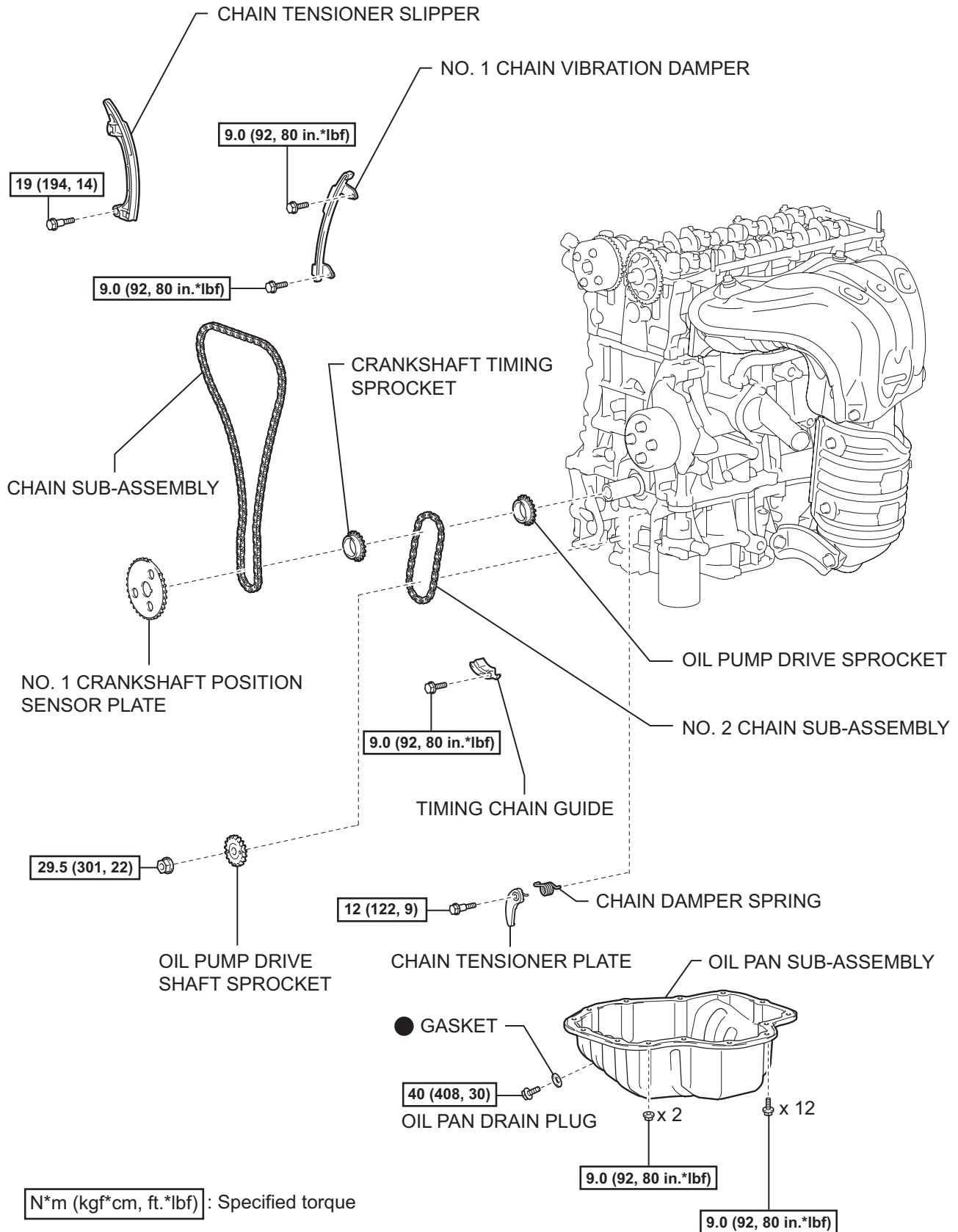
N\*m (kgf\*cm, ft.\*lbf) : Specified torque

● Non-reusable part



N\*m (kgf\*cm, ft.\*lbf) : Specified torque





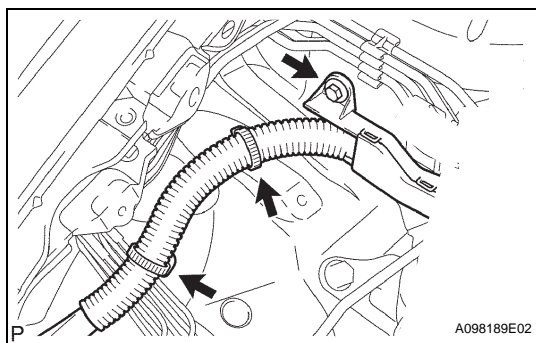
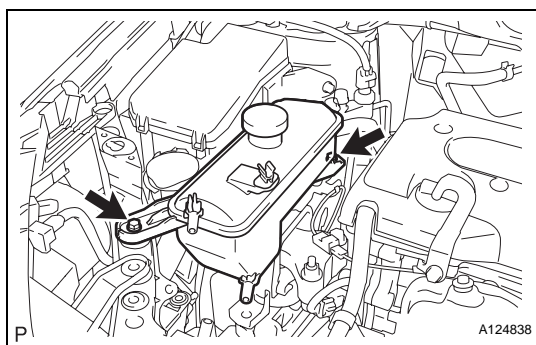
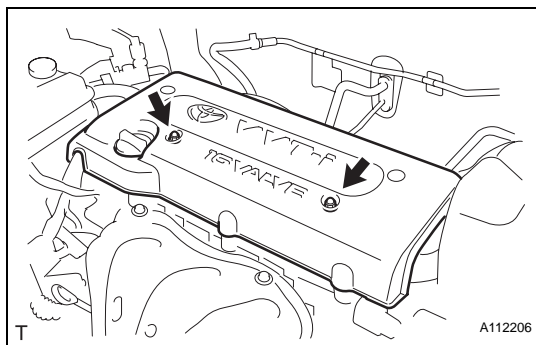
## REMOVAL

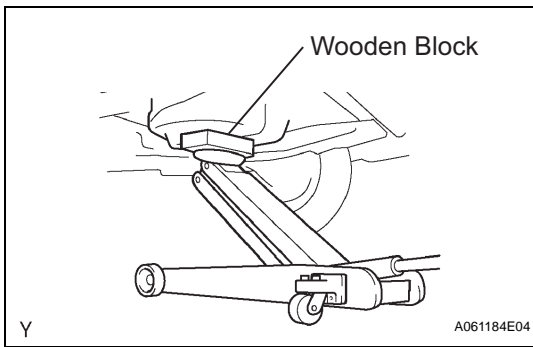
1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

### CAUTION:

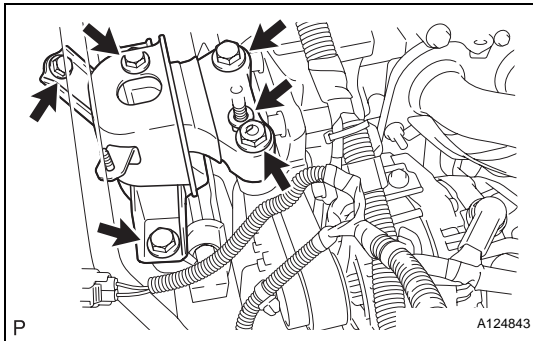
Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

2. REMOVE RADIATOR SUPPORT OPENING COVER
3. REMOVE FRONT WHEEL RH
4. REMOVE NO. 1 ENGINE UNDER COVER
5. REMOVE FRONT FENDER APRON RH
6. REMOVE NO. 1 ENGINE COVER
  - (a) Remove the 2 nuts and cover.
7. DRAIN ENGINE OIL (See page [LU-4](#))
8. REMOVE FRONT EXHAUST PIPE (See page [EX-3](#))
9. REMOVE FRONT SUSPENSION MEMBER REINFORCEMENT RH (See page [EM-6](#))
10. REMOVE FAN AND GENERATOR V BELT (See page [EM-6](#))
11. REMOVE GENERATOR ASSEMBLY (See page [CH-9](#))
12. REMOVE RADIATOR RESERVOIR
  - (a) Remove the 2 bolts and radiator reservoir.
13. REMOVE ENGINE MOUNTING INSULATOR RH
  - (a) Remove the bolt of the wire harness protector.
  - (b) Disconnect the 2 clamps of the engine wire.





- (c) Place a transmission jack underneath the engine, then put a wooden block on the jack.



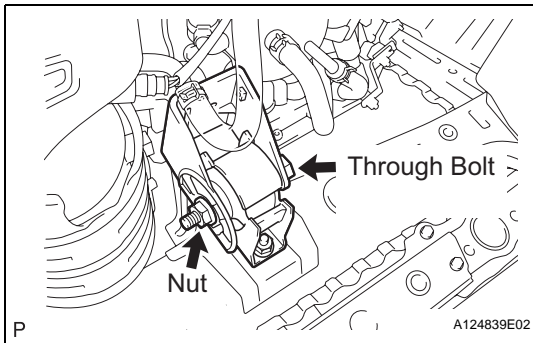
- (d) Remove the 4 bolts, 2 nuts and engine mounting insulator RH.

**NOTICE:**

**Do not apply excessive force to the return tube when removing the engine mounting insulator RH.**

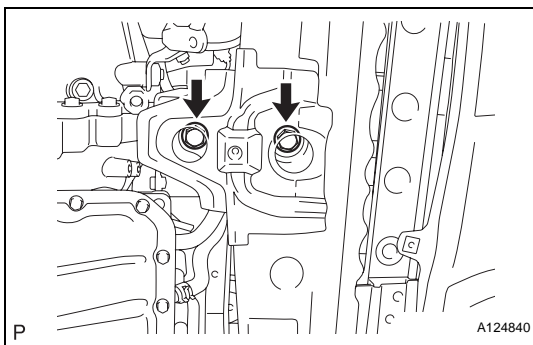
**HINT:**

Keep clearance by lowering the engine using the transmission jack when removing the engine mounting insulator FR.



#### 14. REMOVE ENGINE MOUNTING INSULATOR FR

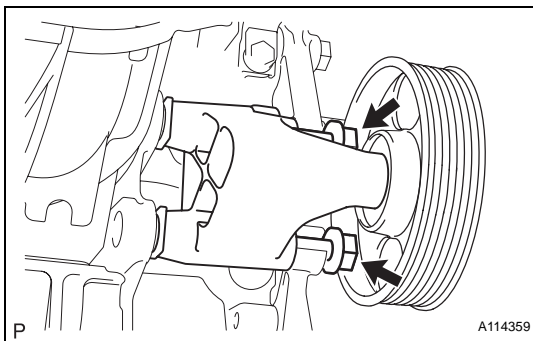
- (a) Remove the through bolt and nut.



- (b) Remove the 2 bolts and engine mounting insulator FR.

**HINT:**

Keep clearance by lowering the engine using the transmission jack when removing the engine mounting insulator FR.

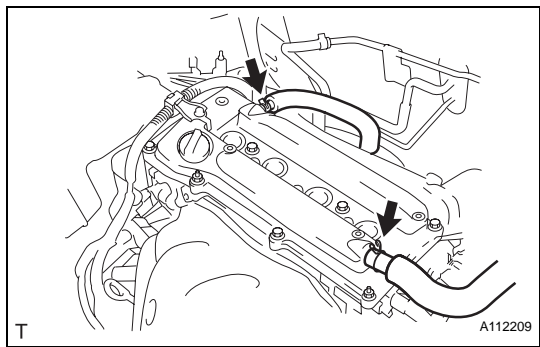


#### 15. REMOVE IDLER PULLEY

- (a) Loosen the 2 bolts and remove the idler pulley with the 2 bolts.

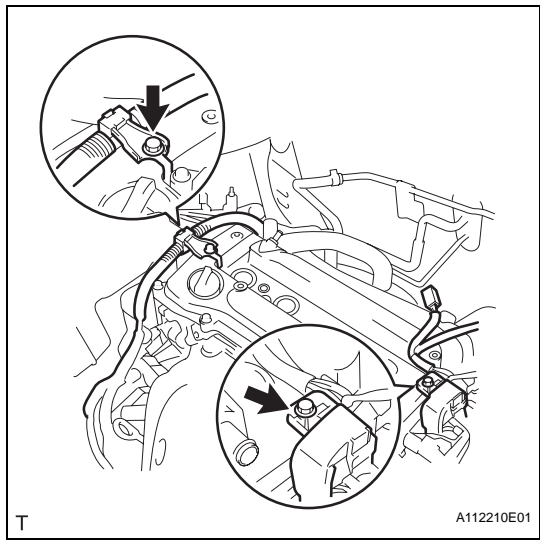
#### 16. REMOVE IGNITION COIL ASSEMBLY (See page [IG-9](#))

#### 17. REMOVE SPARK PLUG (See page [EM-8](#))

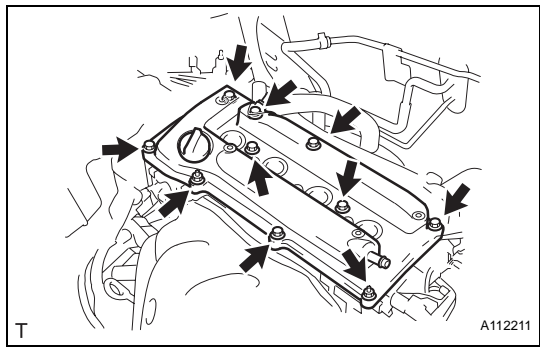


**18. REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY**

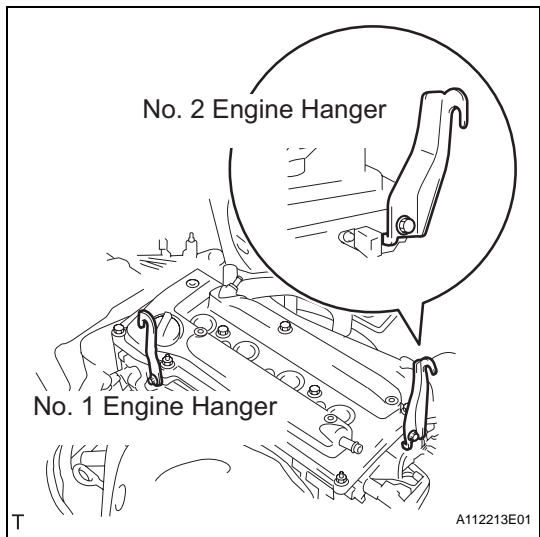
- (a) Disconnect the 2 ventilation hoses from the cylinder head cover.



- (b) Remove the 2 bolts and disconnect the 2 engine wires.



- (c) Remove the 8 bolts, 2 nuts and cylinder head cover.



**19. REMOVE OIL PAN SUB-ASSEMBLY**

- (a) Install the No. 1 and No. 2 engine hangers with the bolts.

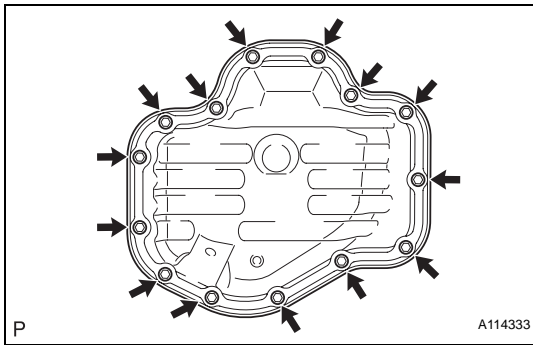
**Torque: 38 N\*m (387 kgf\*cm, 28 ft.\*lbf)**

**Part No.**

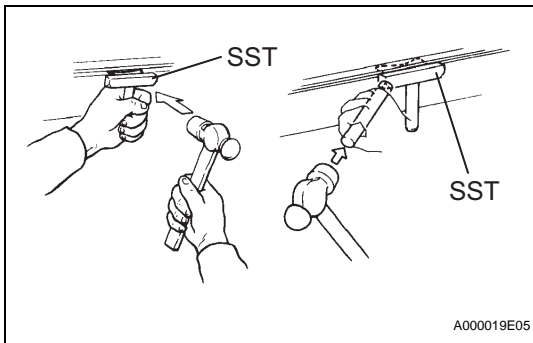
Item	Part No.
No. 1 engine hanger	12281-28010
No. 2 engine hanger	12282-28010
Bolt	91512-61020

- (b) Attach the sling device to the engine hangers and chain block.





- (c) Remove the 12 bolts and 2 nuts.

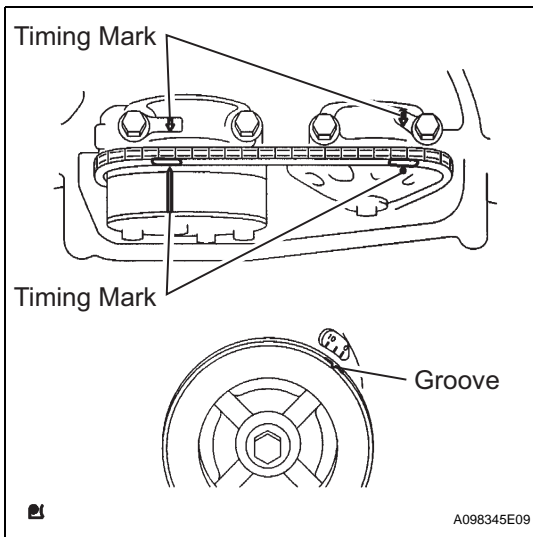


- (d) Insert the blade of SST between the crankcase, chain cover and oil pan, then cut off the applied sealer and remove the oil pan.

**SST 09032-00100**

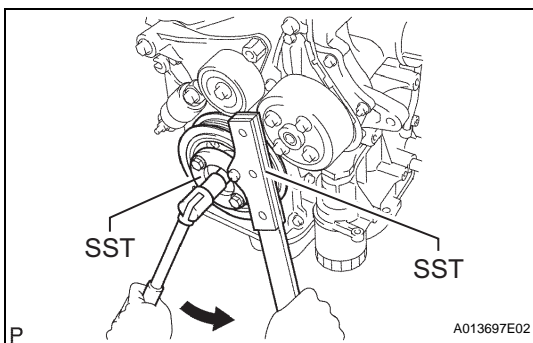
**NOTICE:**

**Be careful not to damage the contact surface of the crankcase, chain cover and oil pan.**



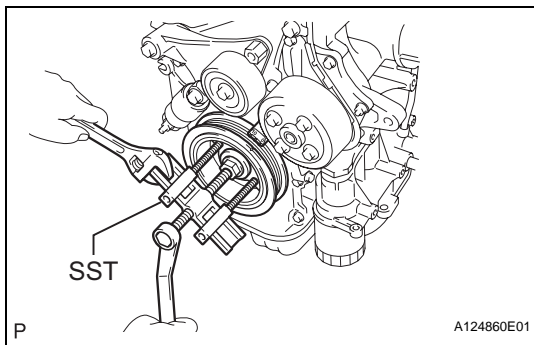
**20. SET NO. 1 CYLINDER TO TDC/COMPRESSION**

- (a) Turn the crankshaft pulley until its groove and the timing mark "0" of the timing chain cover are aligned.
- (b) Check that each timing mark of the camshaft timing gear and sprocket is aligned with each timing mark located on the No. 1 and No. 2 bearing caps as shown in the illustration.  
If not, turn the crankshaft by 1 revolution (360°) to align the timing marks as above.



**21. REMOVE CRANKSHAFT PULLEY**

- (a) Using SST, fix the pulley in place and loosen the pulley bolt.  
**SST 09213-54015 (91651-60855), 09330-00021**

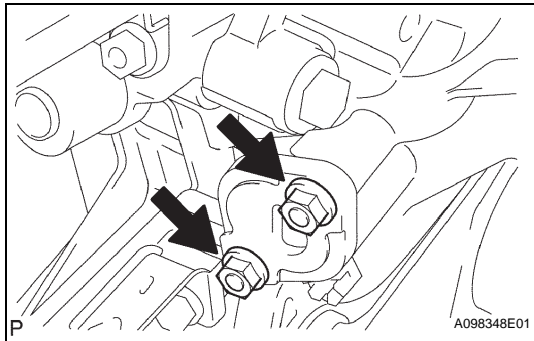


- (b) Remove the crankshaft pulley.

HINT:

If necessary, remove the pulley and pulley bolt using SST.

**SST** 09950-50013 (09951-05010, 09952-05010, 09953-05020, 09954-05021), 09950-40011 (09957-04010)

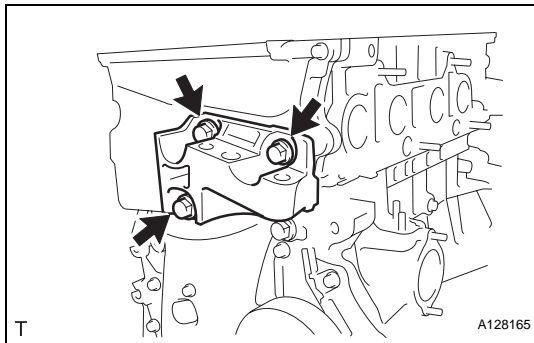


## 22. REMOVE NO. 1 CHAIN TENSIONER ASSEMBLY

- (a) Remove the 2 nuts, chain tensioner and gasket.

**NOTICE:**

**Do not turn the crankshaft without the chain tensioner.**



## 23. REMOVE ENGINE MOUNTING BRACKET RH

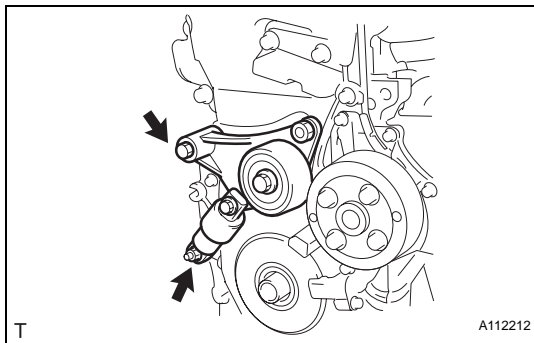
- (a) Remove the 3 bolts and engine mounting bracket RH.

## 24. REMOVE V-RIBBED BELT TENSIONER ASSEMBLY

- (a) Lift the engine upward using the transmission jack.

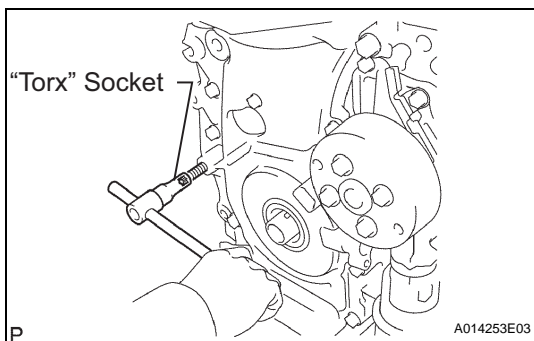
**NOTICE:**

**Do not lift the engine more than necessary.**



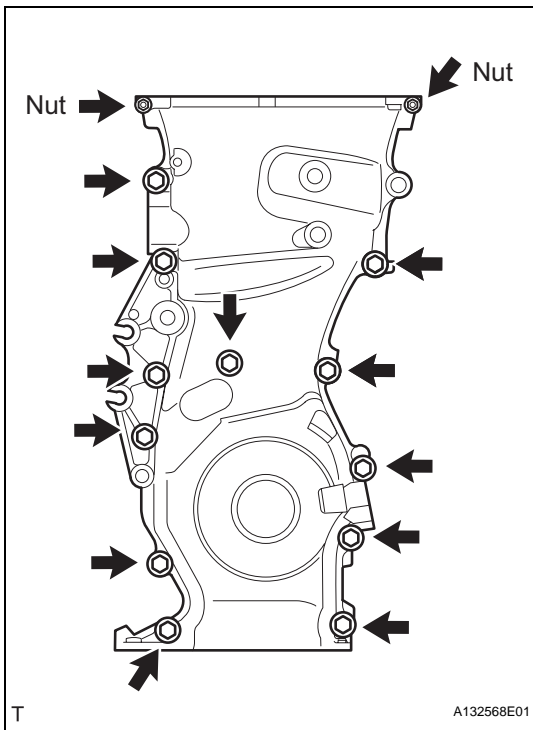
- (b) Remove the bolt, nut and V-ribbed belt tensioner.

## 25. REMOVE CRANKSHAFT POSITION SENSOR (See page ES-402)

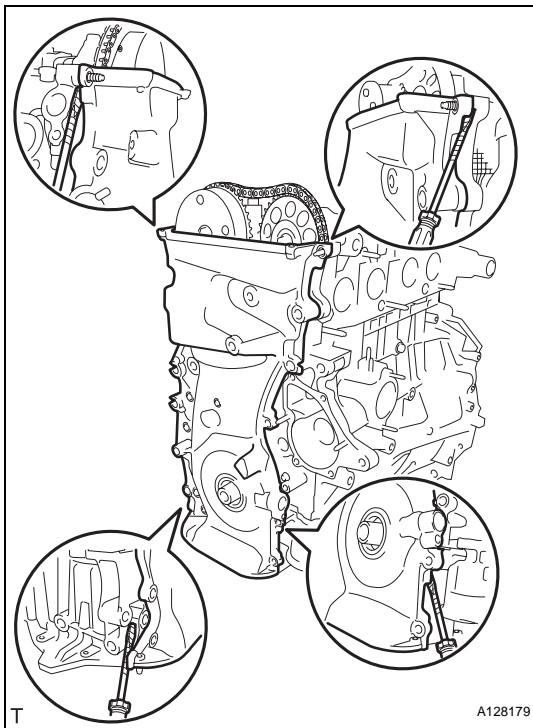


## 26. REMOVE TIMING CHAIN COVER SUB-ASSEMBLY

- (a) Using an E10 "torx" socket, remove the stud bolt for the V-ribbed belt tensioner.



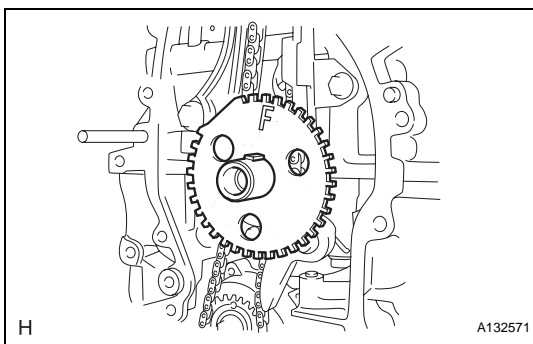
(b) Remove the 12 bolts and 2 nuts.



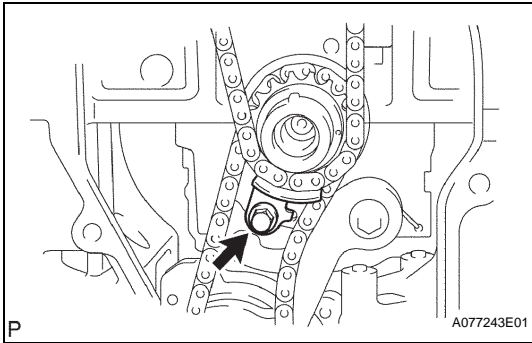
(c) Remove the timing chain cover by prying the portions between the timing chain cover, cylinder head and cylinder block with a screwdriver.

**NOTICE:**

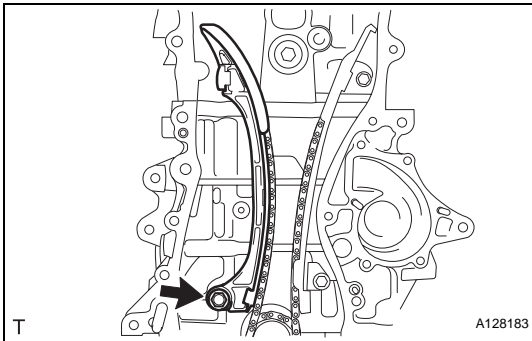
**Be careful not to damage the contact surfaces of the timing chain cover, cylinder head and cylinder block.**



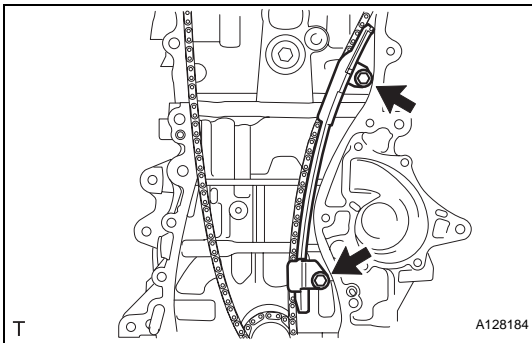
**27. REMOVE NO. 1 CRANKSHAFT POSITION SENSOR PLATE**

**28. REMOVE TIMING CHAIN GUIDE**

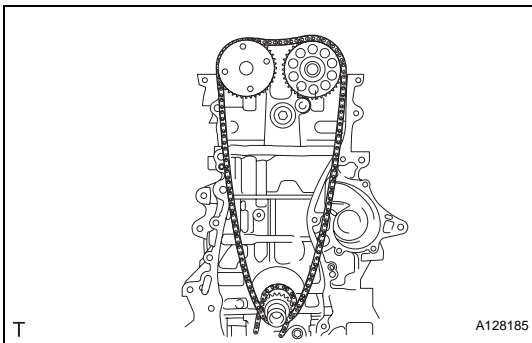
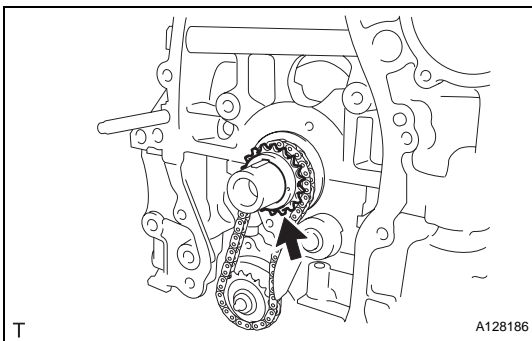
- (a) Remove the bolt and timing chain guide.

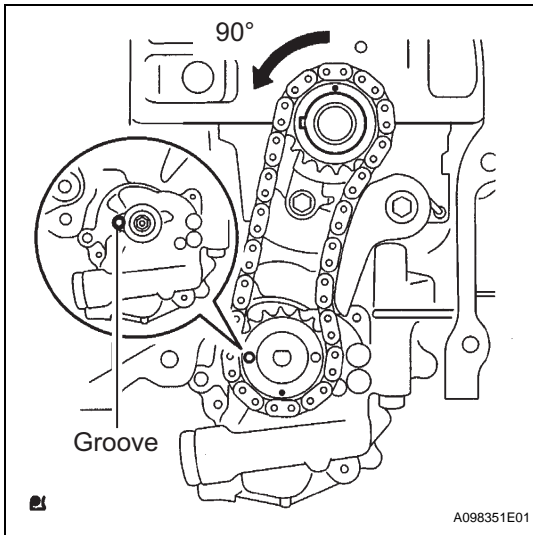
**29. REMOVE CHAIN TENSIONER SLIPPER**

- (a) Remove the bolt and chain tensioner slipper.

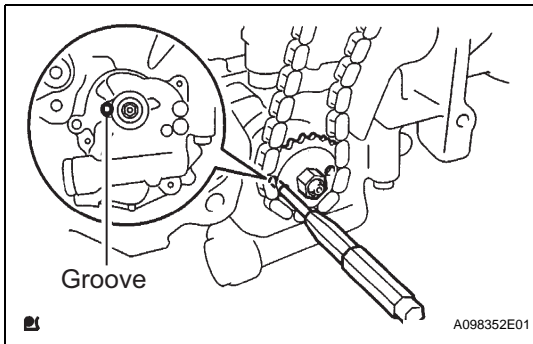
**30. REMOVE NO. 1 CHAIN VIBRATION DAMPER**

- (a) Remove the 2 bolts and chain vibration damper.

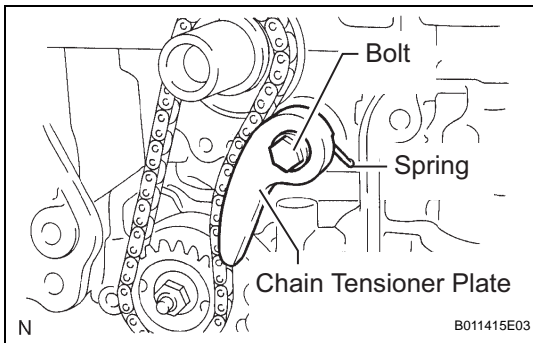
**31. REMOVE CHAIN SUB-ASSEMBLY****32. REMOVE CRANKSHAFT TIMING SPROCKET**

**33. REMOVE NO. 2 CHAIN SUB-ASSEMBLY**

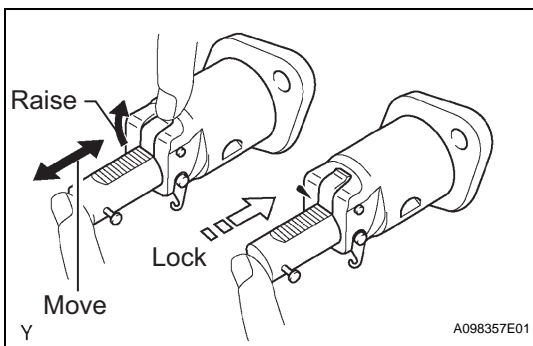
- (a) Turn the crankshaft by 90° counterclockwise to align the adjusting hole of the oil pump drive shaft sprocket with the groove of the oil pump.



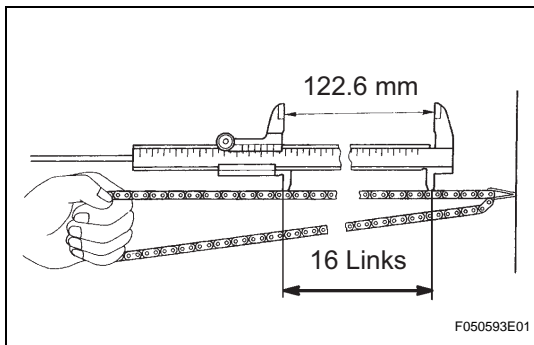
- (b) Insert a 4 mm diameter bar into the adjusting hole of the oil pump drive shaft sprocket to lock the gear in position, and then remove the nut.



- (c) Remove the bolt, chain tensioner plate and spring.
- (d) Remove the oil pump drive sprocket, oil pump drive shaft sprocket and No. 2 chain.

**INSPECTION****1. INSPECT NO. 1 CHAIN TENSIONER**

- (a) Check that the plunger moves smoothly when the ratchet pawl is raised with your finger.
- (b) Release the ratchet pawl, then check that the plunger is locked in place by the ratchet pawl and does not move when pushed with your finger.



## 2. INSPECT CHAIN SUB-ASSEMBLY

- (a) Using a vernier caliper, measure the length of the 16 links with the chain fully stretched.

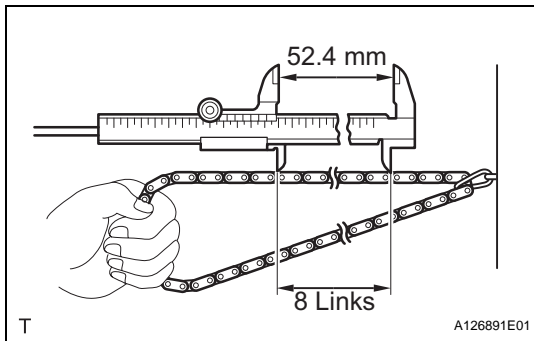
**Maximum chain elongation:**

**122.6 mm (4.827 in.)**

If the chain elongation is greater than the maximum, replace the chain sub-assembly.

**HINT:**

Take the measurements at 3 or more places selected at random.



## 3. INSPECT NO. 2 CHAIN SUB-ASSEMBLY

- (a) Using a vernier caliper, measure the length of the 8 links with the chain fully stretched.

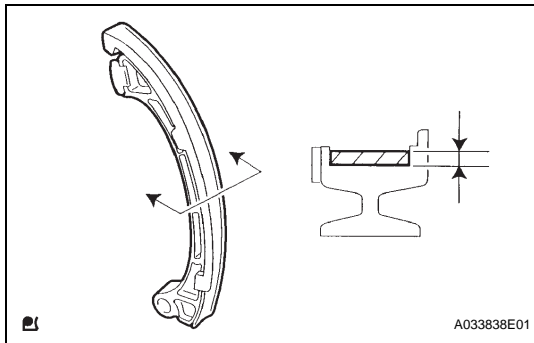
**Maximum chain elongation:**

**52.4 mm (2.063 in.)**

If the chain elongation is greater than the maximum, replace the No. 2 chain sub-assembly.

**HINT:**

Take the measurements at 3 or more places selected at random.



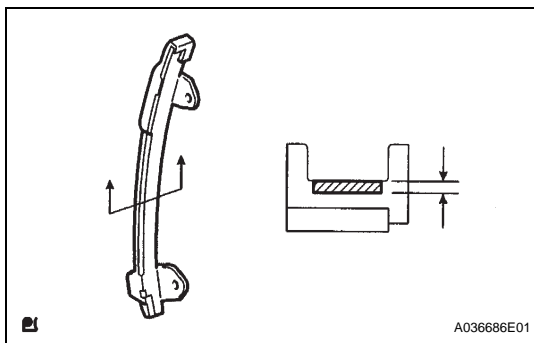
## 4. INSPECT CHAIN TENSIONER SLIPPER

- (a) Using a vernier caliper, measure the tensioner slipper wear.

**Maximum wear:**

**1.0 mm (0.039 in.)**

If the wear is greater than the maximum, replace the chain tensioner slipper.



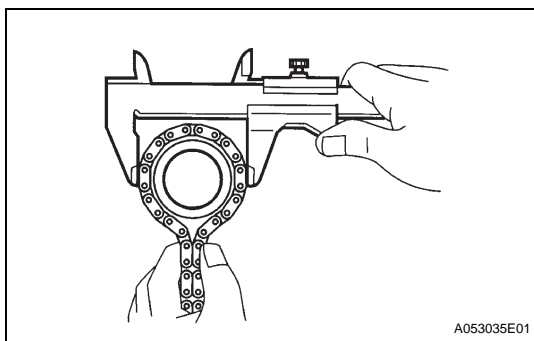
## 5. INSPECT NO. 1 CHAIN VIBRATION DAMPER

- (a) Using a vernier caliper, measure the vibration damper wear.

**Maximum wear:**

**1.0 mm (0.039 in.)**

If the wear is greater than the maximum, replace the No. 1 chain vibration damper.



## 6. INSPECT CRANKSHAFT TIMING SPROCKET

- (a) Wrap the chain around the timing sprocket.  
(b) Using a vernier caliper, measure the timing gear diameter with the chain.

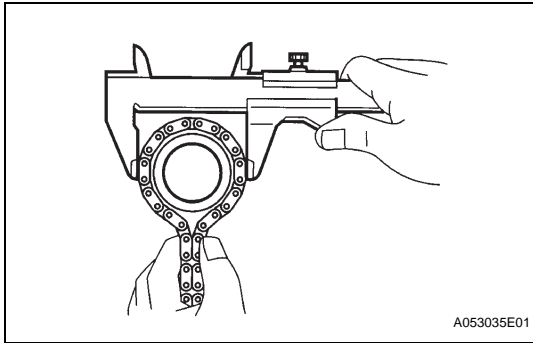
**Minimum gear diameter (with chain):**

**51.6 mm (2.031 in.)**

**NOTICE:**

The vernier caliper must be in contact with the chain rollers when measuring.

If the gear diameter is less than the minimum, replace the chain sub-assembly and crankshaft timing sprocket.



## 7. INSPECT OIL PUMP DRIVE SPROCKET

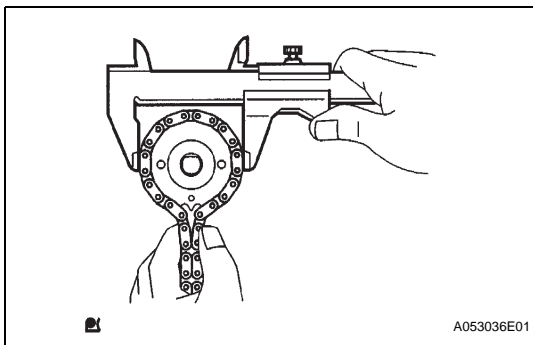
- Wrap the chain around the drive sprocket.
- Using a vernier caliper, measure the drive gear diameter with the chain.

**Minimum gear diameter (with chain):**  
**48.2 mm (1.898 in.)**

### NOTICE:

**The vernier caliper must be in contact with the chain rollers when measuring.**

If the gear diameter is less than the minimum, replace the No. 2 chain sub-assembly and oil pump drive sprocket.



## 8. INSPECT OIL PUMP DRIVE SHAFT SPROCKET

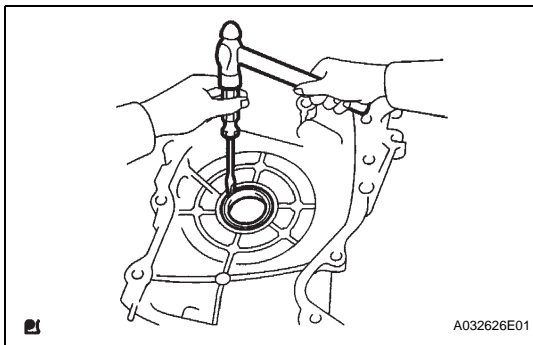
- Wrap the chain around the drive shaft sprocket.
- Using a vernier caliper, measure the drive shaft gear diameter with the chain.

**Minimum gear diameter (with chain):**  
**48.2 mm (1.898 in.)**

### NOTICE:

**The vernier caliper must be in contact with the chain rollers when measuring.**

If the gear diameter is less than the minimum, replace the No. 2 chain sub-assembly and oil pump drive shaft sprocket.



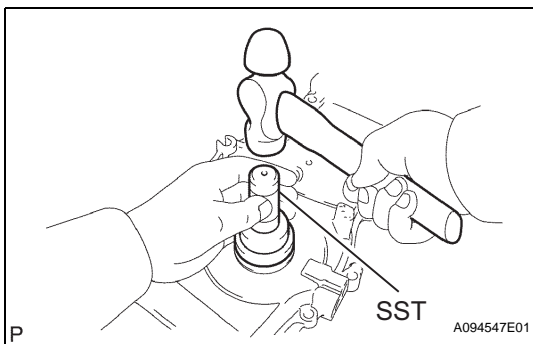
## REPLACEMENT

### 1. REPLACE TIMING CHAIN COVER OIL SEAL

- Using a screwdriver and hammer, tap out the oil seal.
- Place the oil seal retainer on wooden blocks.
- Apply multi-purpose grease to the lip of a new oil seal.

### NOTICE:

**Keep the lip free of foreign objects.**



- Using SST and a hammer, tap in a new oil seal until its surface is flush with the timing gear case edge.

**SST 09223-22010**

### NOTICE:

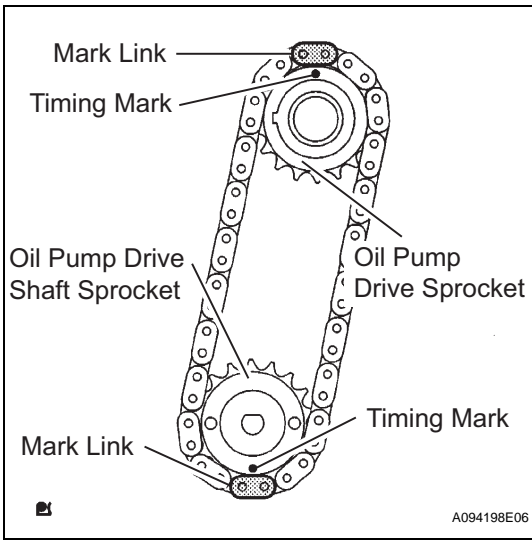
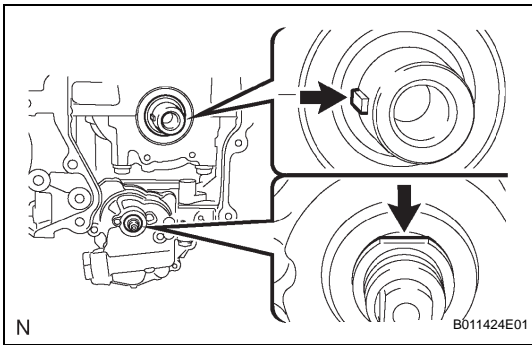
**Do not tap the oil seal at an angle.**



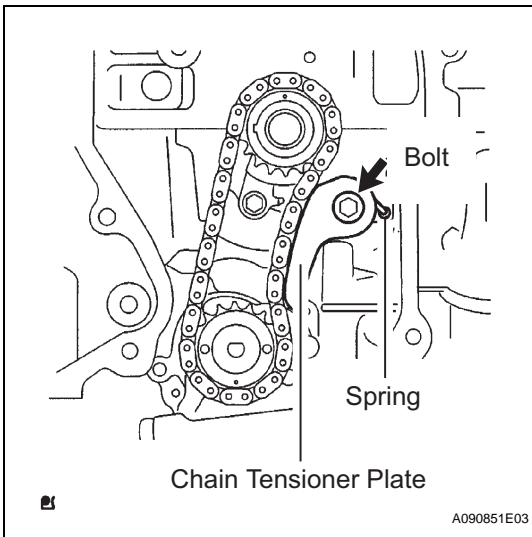
## INSTALLATION

### 1. INSTALL NO. 2 CHAIN SUB-ASSEMBLY

- Set the crankshaft key in the left horizontal position.
- Turn the cutout of the drive shaft so that it faces upward.

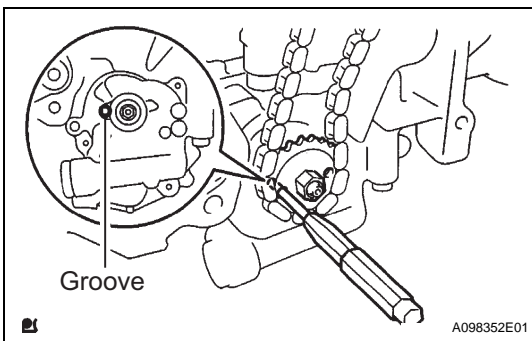


- Align the yellow mark links with the timing marks of each gear as shown in the illustration.
- Install the sprockets onto the crankshaft and oil pump shaft with the chain wrapped on the gears.
- Temporarily tighten the oil pump drive shaft sprocket with the nut.



- Insert the damper spring into the adjusting hole, and then install the chain tensioner plate with the bolt.

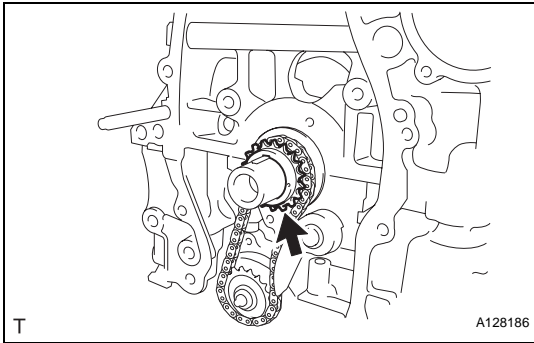
**Torque: 12 N\*m (122 kgf\*cm, 9 ft.\*lbf)**



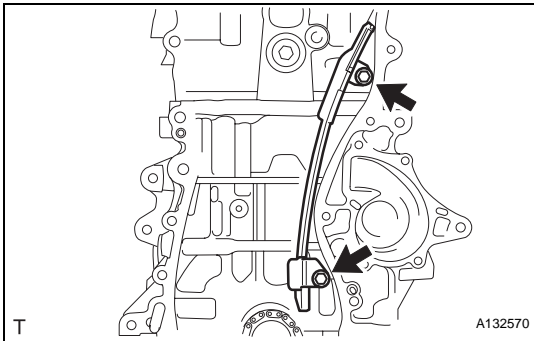
- Align the adjusting hole of the oil pump drive shaft sprocket with the groove of the oil pump.
- Insert a 4 mm diameter bar into the adjusting hole of the oil pump drive shaft gear to lock the gear in position, and then tighten the nut.

**Torque: 29.5 N\*m (301 kgf\*cm, 22 ft.\*lbf)**



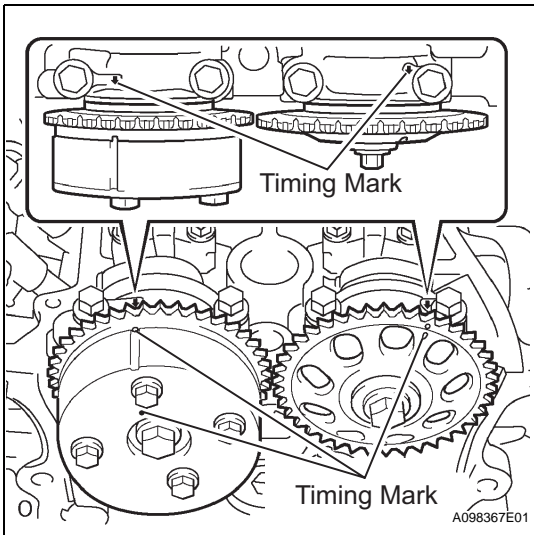


## 2. INSTALL CRANKSHAFT TIMING SPROCKET



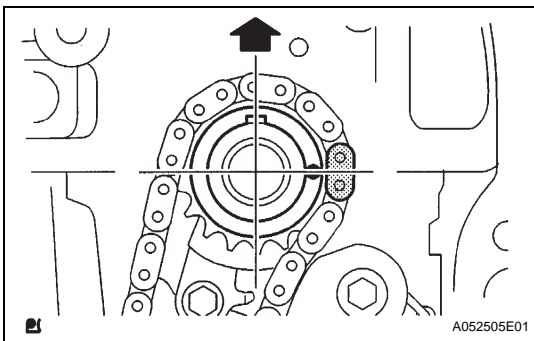
## 3. INSTALL NO. 1 CHAIN VIBRATION DAMPER

- (a) Install the chain vibration damper with the 2 bolts.  
**Torque: 9.0 N\*m (92 kgf\*cm, 80 in.\*lbf)**

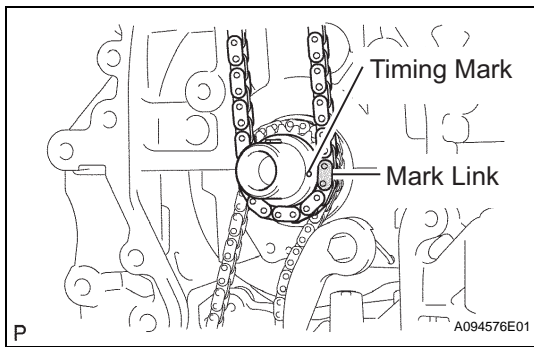


## 4. INSTALL CHAIN SUB-ASSEMBLY

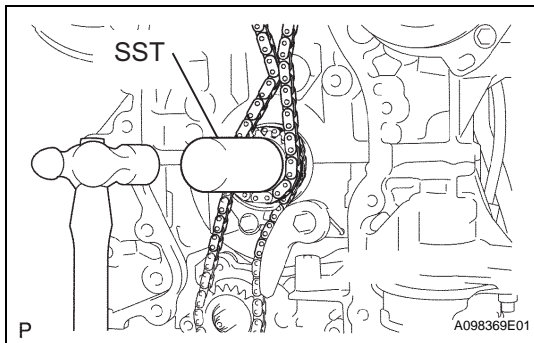
- (a) Set the No. 1 cylinder to TDC/compression.  
(1) Turn the camshafts with a wrench (using the hexagonal lobe) to align the timing marks of the camshaft timing gear with each timing mark located on the No. 1 and No. 2 bearing caps as shown in the illustration.



- (2) Using the crankshaft pulley bolt, turn the crankshaft to position the key on the crankshaft upward.

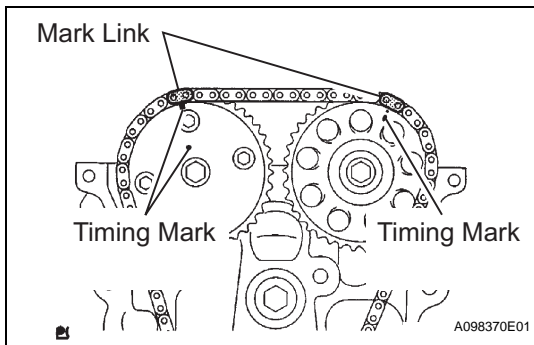


- (b) Install the chain onto the crankshaft timing sprocket with the gold or orange mark link aligned with the timing mark on the crankshaft.

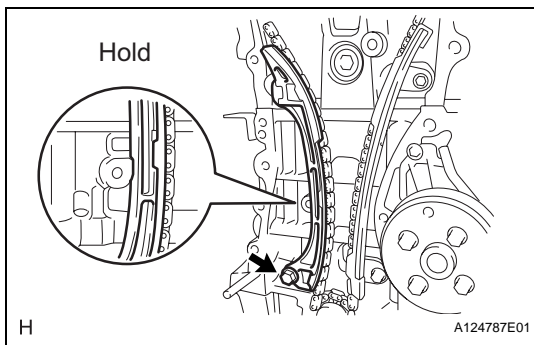


- (c) Using SST and a hammer, tap in the crankshaft timing sprocket.

**SST 09309-37010**

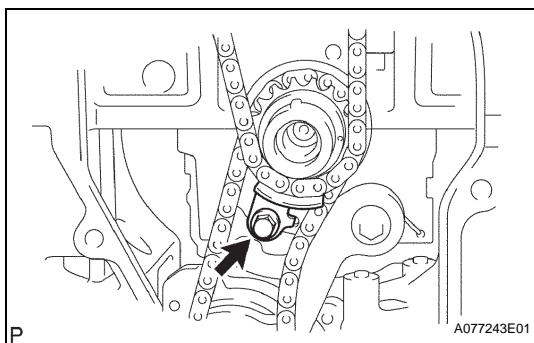


- (d) Align the gold or yellow links with each timing mark located on the camshaft timing gear and sprocket, then install the chain.



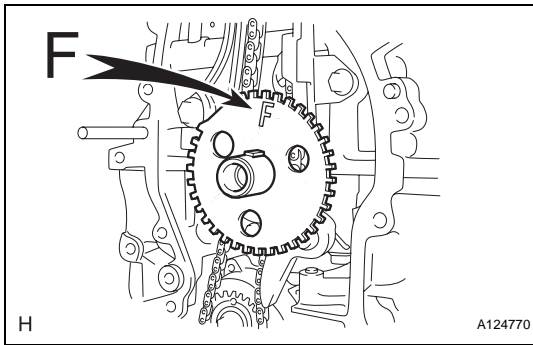
## 5. INSTALL CHAIN TENSIONER SLIPPER

- (a) Install the chain tensioner slipper with the bolt.  
**Torque: 19 N\*m (194 kgf\*cm, 14 ft.\*lbf)**



## 6. INSTALL TIMING CHAIN GUIDE

- (a) Install the timing chain guide with the bolt.  
**Torque: 9.0 N\*m (92 kgf\*cm, 80 in.\*lbf)**

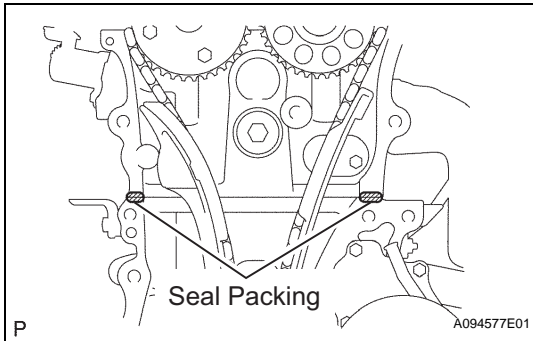


**7. INSTALL NO. 1 CRANKSHAFT POSITION SENSOR PLATE**

- (a) Install the sensor plate with the "F" mark facing forward.

**8. INSTALL TIMING CHAIN COVER SUB-ASSEMBLY**

- (a) Remove any old packing material and be careful not to drop any oil on the contact surfaces of the timing chain cover, cylinder head and cylinder block.



- (b) Apply seal packing (Diameter 4.0 to 4.5 mm (0.157 to 0.177 in.)) as shown in the illustration.

**Seal packing:**

**Toyota Genuine Seal Packing Block, Three Bond 1207B or Equivalent**

**NOTICE:**

- Remove any oil from the contact surface.
- Install the chain cover within 3 minutes of applying seal packing.
- Do not add engine oil for at least 2 hours after installing the chain cover.

- (c) Apply a continuous bead of seal packing as shown in the illustration.

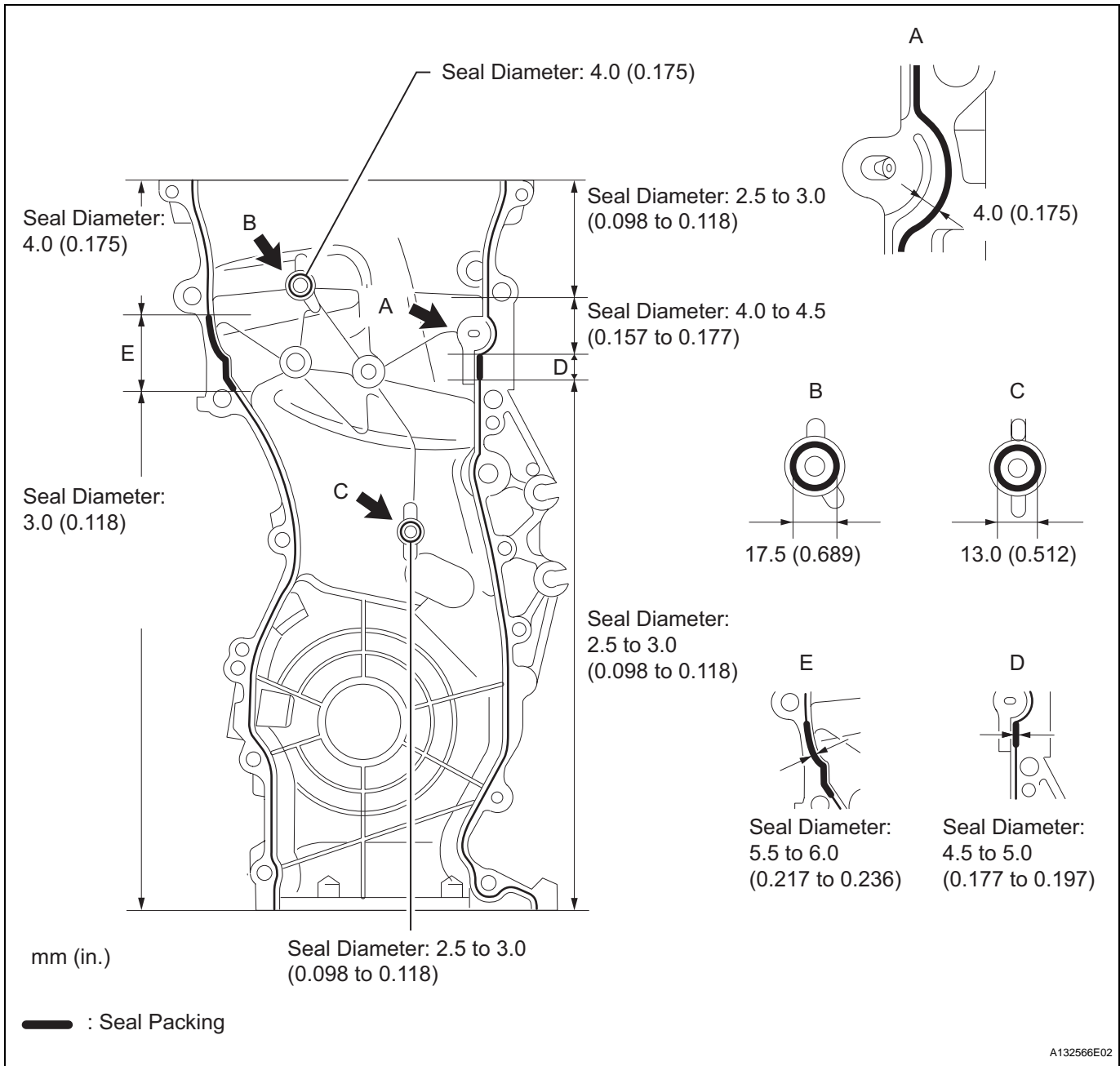
**Seal packing:**

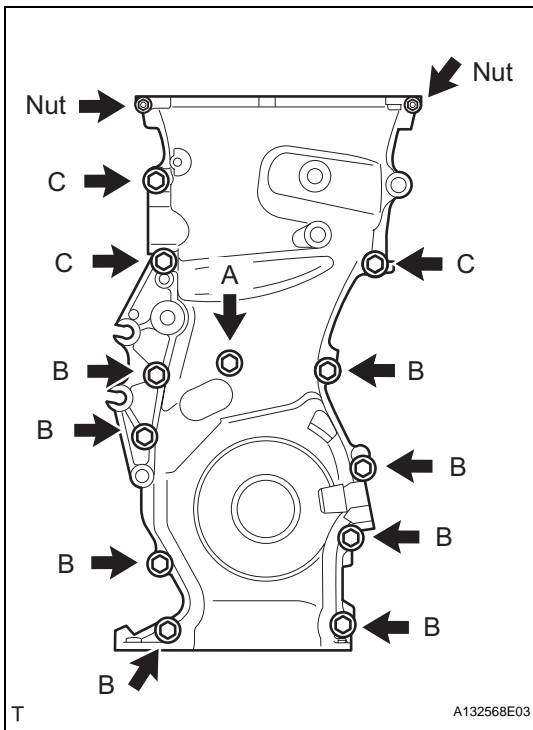
**Toyota Genuine Seal Packing Block, Three Bond 1207B or Equivalent**

**NOTICE:**

- Remove any oil from the contact surface.
- Install the chain cover within 3 minutes of applying seal packing.

- Do not add engine oil for at least 2 hours after installing the chain cover.





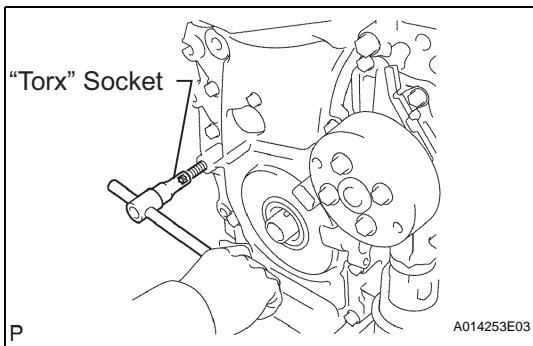
- (d) Install the timing chain cover with the 12 bolts and 2 nuts.

**Torque:** 9.0 N\*m (92 kgf\*cm, 80 in.\*lbf) for bolt A  
 25 N\*m (255 kgf\*cm, 18 ft.\*lbf) for bolt B  
 55 N\*m (561 kgf\*cm, 41 ft.\*lbf) for bolt C  
 11 N\*m (112 kgf\*cm, 8 ft.\*lbf) for nut

**HINT:**

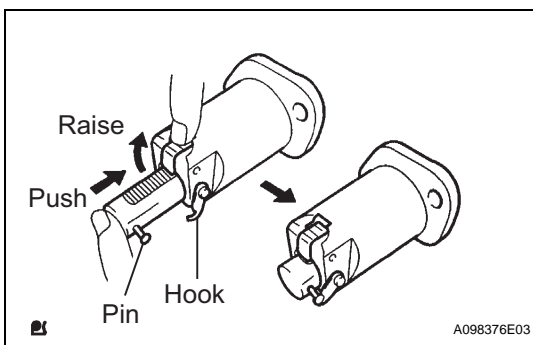
Bolt length:

Bolt A	30 mm (1.18 in.) length for 10 mm head
Bolt B	30 mm (1.18 in.) length for 12 mm head
Bolt C	40 mm (1.57 in.) length for 14 mm head



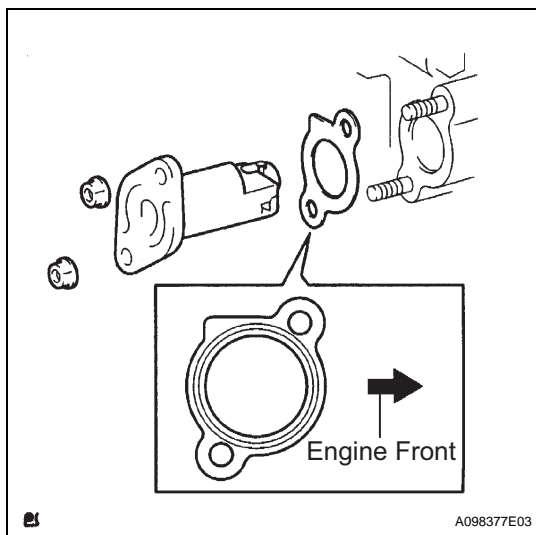
- (e) Using an E10 "torx" socket, install the stud bolt for the V-ribbed belt tensioner.

**Torque:** 21.5 N\*m (219 kgf\*cm, 16 ft.\*lbf)



## 9. INSTALL NO. 1 CHAIN TENSIONER ASSEMBLY

- (a) Release the ratchet pawl, then fully push in the plunger and hook the hook to the pin so that the plunger is in the position shown in the illustration.



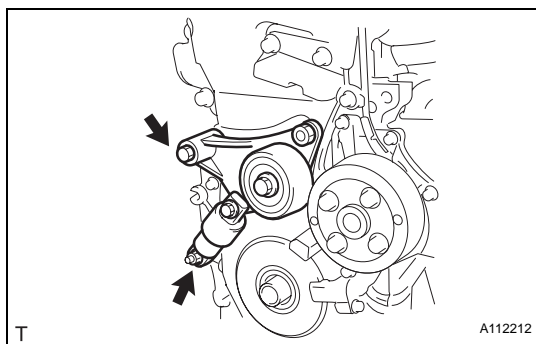
- (b) Install a new gasket and the chain tensioner with the 2 nuts.

**Torque: 9.0 N\*m (92 kgf\*cm, 80 in.\*lbf)**

**NOTICE:**

**When installing the chain tensioner, set the hook again if the hook releases the plunger.**

EM



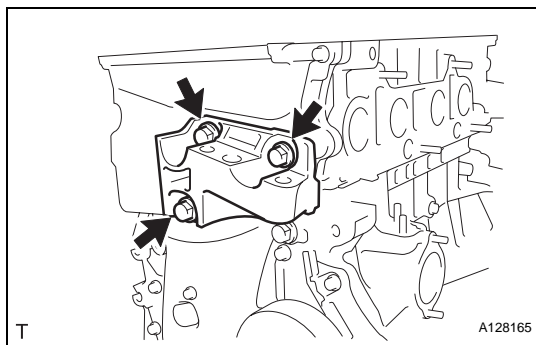
**10. INSTALL V-RIBBED BELT TENSIONER ASSEMBLY**

- (a) Install the V-ribbed belt tensioner with the bolt and nut.

**Torque: 59.5 N\*m (607 kgf\*cm, 44 ft.\*lbf)**

**NOTICE:**

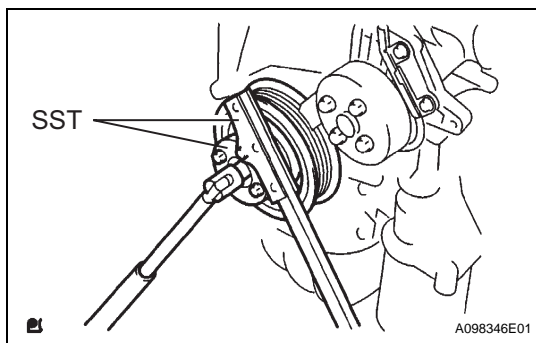
**Do not lift the engine more than necessary.**



**11. INSTALL ENGINE MOUNTING BRACKET RH**

- (a) Install the engine mounting bracket RH with the 3 bolts.

**Torque: 55 N\*m (561 kgf\*cm, 41 ft.\*lbf)**

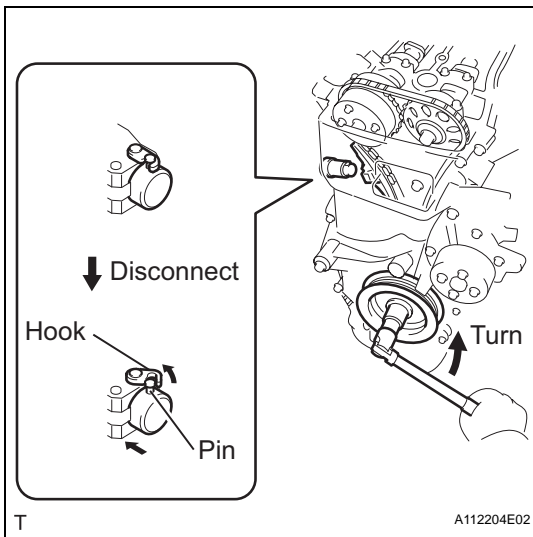


**12. INSTALL CRANKSHAFT PULLEY**

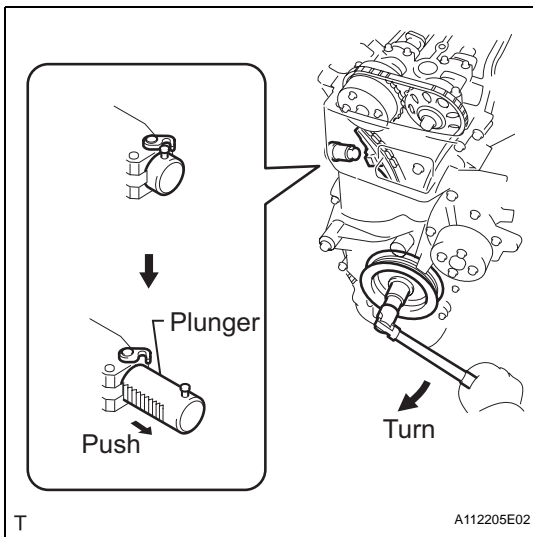
- (a) Using SST, fix the pulley in place and tighten the bolt.

**SST 09213-54015 (91651-60855), 09330-00021**

**Torque: 180 N\*m (1,835 kgf\*cm, 133 ft.\*lbf)**



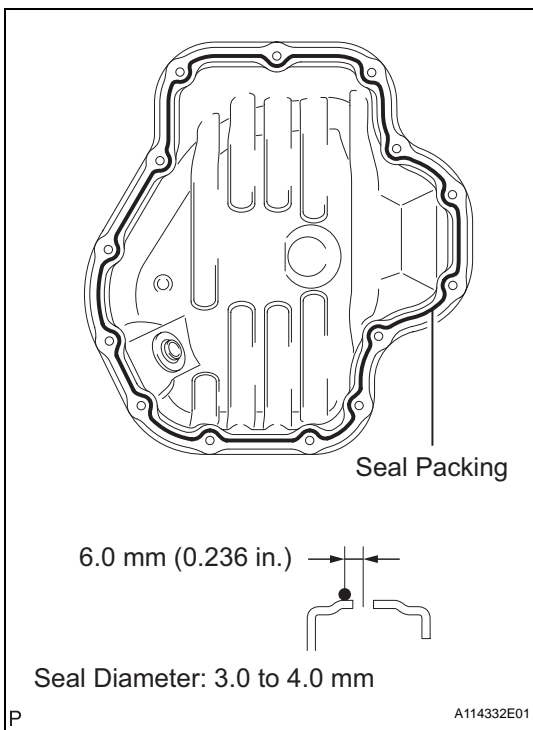
- (b) Turn the crankshaft counterclockwise, then disconnect the plunger knock pin from the hook.



- (c) Turn the crankshaft clockwise, then check that the plunger is extended.

### 13. INSTALL OIL PAN SUB-ASSEMBLY

- (a) Remove any old packing material and be careful not to drop any oil on the contact surfaces of the cylinder block and oil pan.



- (b) Apply a continuous bead of seal packing (Diameter 3.0 to 4.0 mm (0.118 to 0.157 in.)) as shown in the illustration.

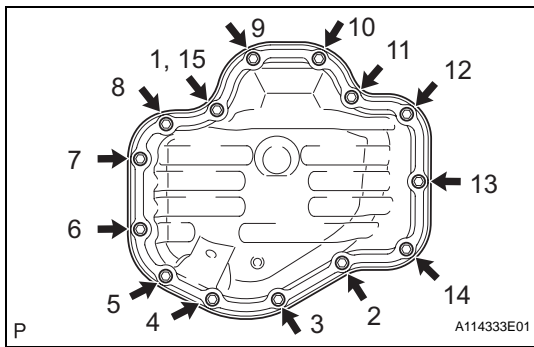
#### Seal packing:

**Toyota Genuine Seal Packing Block, Three Bond 1207B or Equivalent**

#### NOTICE:

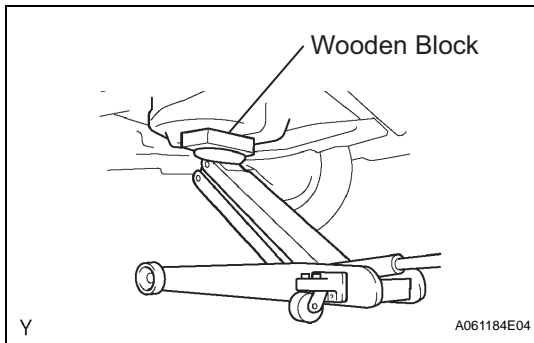
- Remove any oil from the contact surface.
- Install the oil pan within 3 minutes of applying seal packing.
- Do not add engine oil for at least 2 hours after installing the oil pan.

- (c) Install the oil pan to the cylinder block.



- (d) Uniformly tighten the 12 bolts and 2 nuts in the sequence shown in the illustration.

**Torque: 9.0 N\*m (92 kgf\*cm, 80 in.\*lbf)**



- (e) Place a transmission jack underneath the engine, then put a wooden block on the jack.

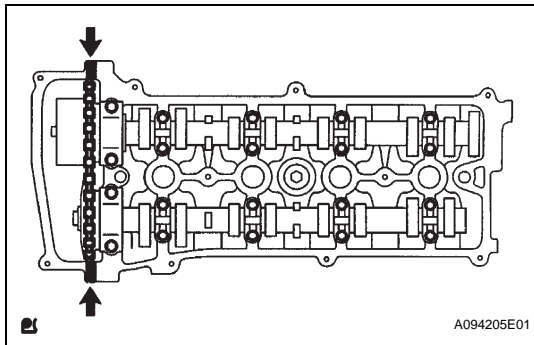
- (f) Remove the chain block and sling device.

- (g) Remove the No. 1 and No. 2 engine hangers.

#### 14. INSTALL CRANKSHAFT POSITION SENSOR (See page [ES-402](#))

#### 15. INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY

- (a) Remove any old packing material from the contact surface.



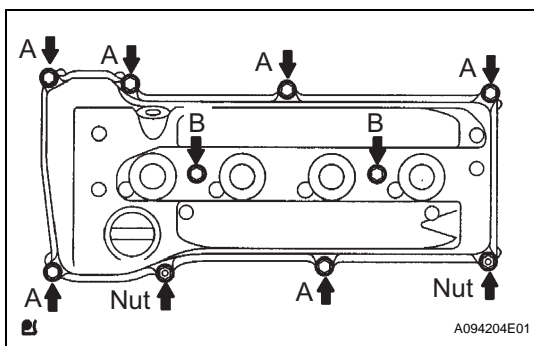
- (b) Apply seal packing to the 2 locations shown in the illustration.

##### Seal packing:

**Toyota Genuine Seal Packing Block, Three Bond 1207B or Equivalent**

##### NOTICE:

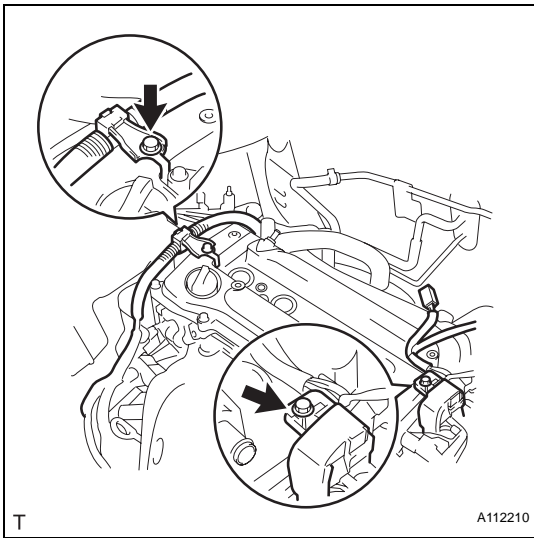
- Remove any oil from the contact surface.
- Install the oil pan within 3 minutes of applying seal packing.
- Do not add engine oil for at least 2 hours after installing the oil pan.



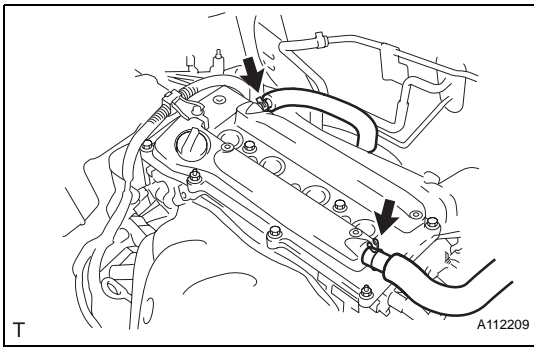
- (c) Install the cylinder head cover with the 8 bolts and 2 nuts.

**Torque: 11 N\*m (112 kgf\*cm, 8 ft.\*lbf) for bolt A**  
**14 N\*m (143 kgf\*cm, 10 ft.\*lbf) for bolt B**  
**11 N\*m (112 kgf\*cm, 8 ft.\*lbf) for nut**





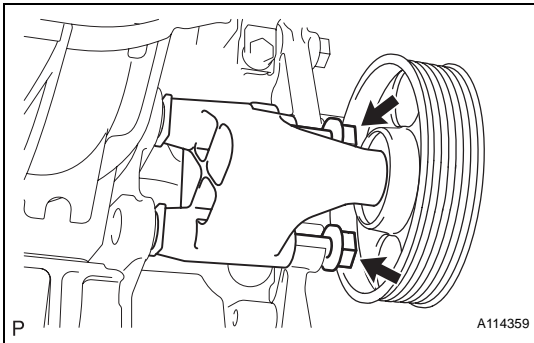
- (d) Install the 2 engine wires with the 2 bolts.  
**Torque: 8.4 N\*m (86 kgf\*cm, 74 in.\*lbf)**



- (e) Connect the 2 ventilation hoses to the cylinder head cover.

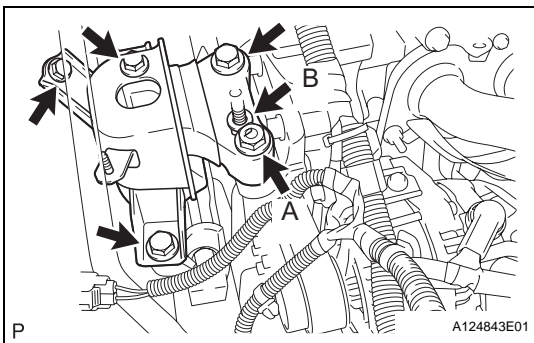
**16. INSTALL SPARK PLUG (See page [EM-16](#))**

**17. INSTALL IGNITION COIL ASSEMBLY (See page [IG-9](#))**



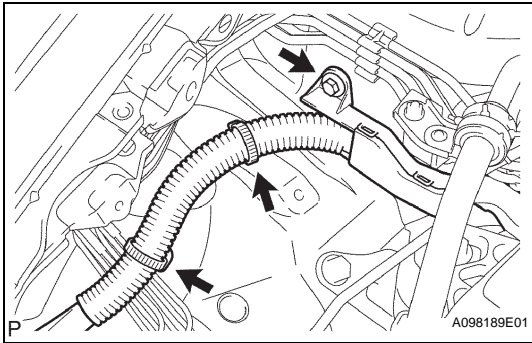
**18. INSTALL IDLER PULLEY**

- (a) Install the idler pulley with the 2 bolts.  
**Torque: 60 N\*m (612 kgf\*cm, 44 ft.\*lbf)**



**19. INSTALL ENGINE MOUNTING INSULATOR RH**

- (a) Install the engine mounting insulator RH with the 4 bolts and 2 nuts.  
**Torque: 95 N\*m (969 kgf\*cm, 70 ft.\*lbf) for bolt**  
**95 N\*m (969 kgf\*cm, 70 ft.\*lbf) for nut A**  
**52 N\*m (530 kgf\*cm, 38 ft.\*lbf) for nut B**

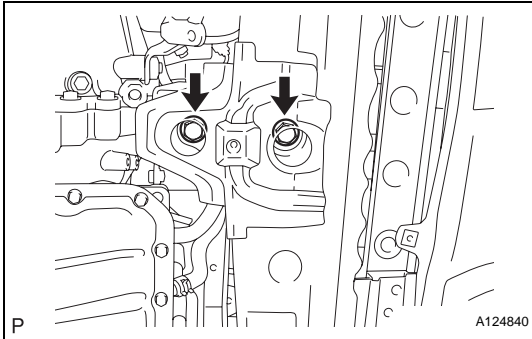


- (b) Connect the 2 clamps of the engine wire.
- (c) Install the wire harness protector with the bolt.

## 20. INSTALL ENGINE MOUNTING INSULATOR FR

- (a) Install the engine mounting insulator FR with the 2 bolts.

**Torque: 95 N\*m (969 kgf\*cm, 70 ft.\*lbf)**

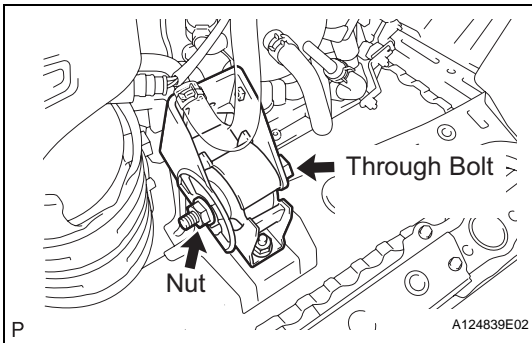


- (b) Install the through bolt and nut.

**Torque: 145 N\*m (1,479 kgf\*cm, 107 ft.\*lbf)**

**HINT:**

Install the bolt which is used to secure the front engine mounting bracket FR.



## 21. INSTALL RADIATOR RESERVOIR

- (a) Install the radiator reservoir with the 2 bolts.

**Torque: 5.0 N\*m (51 kgf\*cm, 44 in.\*lbf)**

## 22. INSTALL GENERATOR ASSEMBLY (See page [CH-15](#))

## 23. INSTALL FAN AND GENERATOR V BELT (See page [EM-7](#))

## 24. INSTALL FRONT SUSPENSION MEMBER REINFORCEMENT RH (See page [EM-7](#))

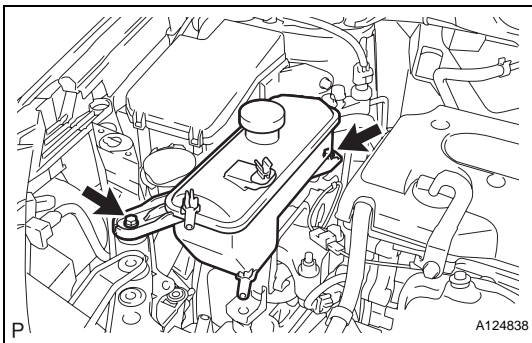
## 25. INSTALL FRONT EXHAUST PIPE (See page [EX-4](#))

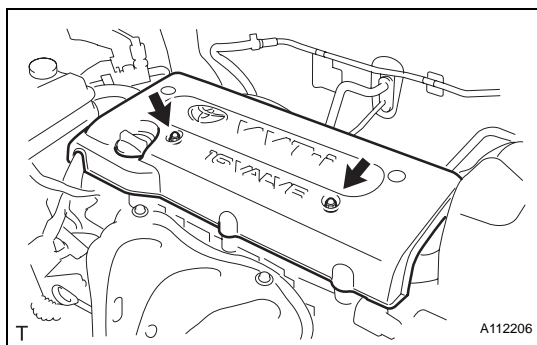
## 26. ADD ENGINE OIL (See page [LU-4](#))

## 27. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

## 28. CHECK FOR ENGINE OIL LEAKS

## 29. CHECK FOR EXHAUST GAS LEAKS



**30. INSTALL NO. 1 ENGINE COVER**

- (a) Install the engine cover with the 2 nuts.  
Torque: 7.0 N\*m (71 kgf\*cm, 62 in.\*lbf)

**31. INSTALL FRONT FENDER APRON RH****32. INSTALL NO. 1 ENGINE UNDER COVER****33. INSTALL FRONT WHEEL RH****34. INSTALL RADIATOR SUPPORT OPENING COVER**